

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

- 1 1. (Currently Amended) An X-ray generating apparatus, comprising:
2 [[a]] first and second semiconductor structure structures, the first semiconductor structure
3 spaced apart from the second semiconductor structure;
4 an emitter formed on the first semiconductor structure, the emitter to emit electrons that
5 travel in a path in a space between the first and second semiconductor structures; and
6 an element to generate X-rays in response to impact by the electrons on the element.
- 1 2. (Currently Amended) The X-ray generating apparatus of claim 1, further comprising a
2 deflecting mechanism to deflect ~~a path~~ of the electrons.
- 1 3. (Currently Amended) The X-ray generating apparatus of claim 2, wherein the path of the
2 electrons comprises a first path, and wherein the deflecting mechanism is adapted to deflect the
3 electrons from a ~~first~~ second path to ~~a second~~ the first path, the first path being at a non-zero
4 angle with respect to the second path.
- 1 4. (Original) The X-ray generating apparatus of claim 3, wherein the deflecting mechanism
2 is adapted to generate an electric field to deflect the electrons.
- 1 5. (Original) The X-ray generating apparatus of claim 3, wherein the deflecting mechanism
2 is adapted to generate a magnetic field to deflect the electrons.
- 1 6. (Original) The X-ray generating apparatus of claim 1, wherein the emitter comprises a
2 field emitter.
- 1 7. (Original) The X-ray generating apparatus of claim 1, wherein the emitter comprises a
2 pointed tip and elements to apply an electric field to cause emission of electrons from the pointed
3 tip.

1 8. (Original) The X-ray generating apparatus of claim 7, wherein the emitter further
2 comprises a lens element to focus the electrons emitted from the pointed tip.

1 9. (Original) The X-ray generating apparatus of claim 7, wherein the emitter further
2 comprises a lens element to collimate the electrons emitted from the pointed tip.

1 10. (Currently Amended) ~~The X-ray generating apparatus of claim 1, further comprising An~~
2 X-ray generating apparatus, comprising:
3 a semiconductor structure;
4 an emitter formed on the semiconductor structure, the emitter to emit electrons;
5 an element to generate X-rays in response to impact by the electrons on the element; and
6 an accelerator having electrodes formed on the semiconductor structure, the accelerator to
7 accelerate the electrons.

1 11. (Original) The X-ray generating apparatus of claim 10, further comprising a magnetic
2 device to apply a magnetic field to cause the electrons to travel in a curved path.

1 12. (Original) The X-ray generating apparatus of claim 11, wherein the accelerator is
2 positioned to be immersed in the magnetic field.

1 13. (Original) The X-ray generating apparatus of claim 11, further comprising circuitry to
2 apply alternating current (AC) signals to the electrodes.

1 14. (Original) The X-ray generating apparatus of claim 13, wherein the accelerator
2 comprises a cyclotron.

1 15. (Original) The X-ray generating apparatus of claim 11, wherein the magnetic field varies
2 radially along a direction in a plane parallel to a surface of the semiconductor structure.

1 16. (Original) The X-ray generating apparatus of claim 10, further comprising a second
2 semiconductor structure and additional electrodes formed on the second semiconductor structure,
3 the additional electrodes being part of the accelerator.

1 17. (Original) The X-ray generating apparatus of claim 16, wherein the semiconductor
2 structures comprise semiconductor dies.

1 18. (Original) The X-ray generating apparatus of claim 16, wherein the semiconductor
2 structures have respective surfaces that are generally parallel to each other, the X-ray generating
3 apparatus further comprising a deflecting mechanism to deflect the electrons from a first path to
4 a second path,
5 the second path being generally parallel to the surfaces of the semiconductor structures.

1 19. (Original) The X-ray generating apparatus of claim 1, wherein the element is formed of a
2 material containing tungsten.

1 20. (Original) The X-ray generating apparatus of claim 1, wherein the element is formed of a
2 material containing molybdenum.

1 21. (Currently Amended) A method of generating X-rays, comprising:
2 activating an emitter on a first semiconductor structure to emit electrons; and
3 directing the electrons along a path between the first semiconductor structure and a
4 second semiconductor structure onto a target to cause the target to generate X-rays,
5 wherein directing the electrons comprises directing the electrons using a deflecting
6 mechanism having electrodes on the first and second semiconductor structures.

1 22. (Original) The method of claim 21, wherein activating the emitter comprises generating
2 an electric field to cause emission of electrons from a pointed tip in the emitter.

1 23. (Original) The method of claim 22, further comprising collimating the emitted electrons
2 using a lens element.

1 24. (Original) The method of claim 21, further comprising deflecting the emitted electrons
2 from a first path to a second path.

1 25. (Original) The method of claim 24, further comprising accelerating the electrons
2 traveling in the second path to increase an energy of the electrons prior to impact of the electrons
3 onto the target.

1 26. (Currently Amended) ~~The method of claim 25,~~ A method of generating X-rays,
2 comprising:
3 activating an emitter on a semiconductor structure to emit electrons;
4 directing the electrons onto a target to cause the target to generate X-rays;
5 deflecting the emitted electrons from a first path to a second path; and
6 accelerating the electrons traveling in the second path to increase an energy of the
7 electrons prior to impact of the electrons onto the target,
8 wherein accelerating the electrons comprises accelerating the electrons with an
9 accelerator having electrodes formed on the semiconductor structure.

1 27. (Original) The method of claim 26, further comprising applying a magnetic field, the
2 accelerator immersed in the magnetic field.

1 28. (Original) The method of claim 27, further comprising varying the magnetic field
2 radially from a point on the semiconductor structure across a plane parallel to a surface of the
3 semiconductor structure.

1 29. (Cancelled)

1 30. (Currently Amended) ~~The X-ray source device of claim 29, further comprising~~ An X-ray
2 source device, comprising:

3 a housing defining a chamber;

4 a semiconductor structure disposed in the chamber, the chamber containing a vacuum;

5 a field emitter formed on the semiconductor structure to emit electrons;

6 a target in the chamber to generate X-rays in response to impact by the electrons; and

7 an accelerator having electrodes formed on the semiconductor structure, the accelerator to
8 accelerate the electrons prior to impact on the target.

1 31. (Original) The X-ray source device of claim 30, further comprising a magnetic device to
2 generate a magnetic field to cause the electrons to travel in a curved path as the electrons are
3 accelerated by the accelerator.

1 32. (Currently Amended) An X-ray source device, comprising:

2 a housing defining a chamber;

3 at least two semiconductor structures disposed in the chamber, the chamber containing a
4 vacuum, the at least two semiconductor structures being generally parallel to each other;

5 a field emitter formed on one of the at least two semiconductor structures to emit
6 electrons;

7 a deflecting mechanism in the chamber to deflect the electrons from a first path to a
8 second path, the second path extending along a space between the at least two semiconductor
9 structures; and

10 a target in the chamber to generate X-rays in response to impact by the electrons.

1 33. (New) The X-ray source device of claim 32, wherein the second path is generally
2 parallel to the at least two semiconductor structures.

1 34. (New) The X-ray source device of claim 32, further comprising an accelerator having
2 electrodes formed on at least one of the at least two semiconductor structures.

1 35. (New) The X-ray source device of claim 32, wherein the at least two semiconductor
2 structures are spaced apart from each other.

1 36. (New) The X-ray generating apparatus of claim 2, wherein the deflecting mechanism has
2 electrodes formed on the first and second semiconductor structures.

1 37. (New) The X-ray generating apparatus of claim 1, wherein the emitter comprises a field
2 emitter having an extractor to extract electrons by creating an electric field,
3 the X-ray generating apparatus further comprising an electronic circuit formed on at least
4 one of the first and second semiconductor structures to provide electrical energy to the extractor.